Interactions between microbiology and all other stakeholders

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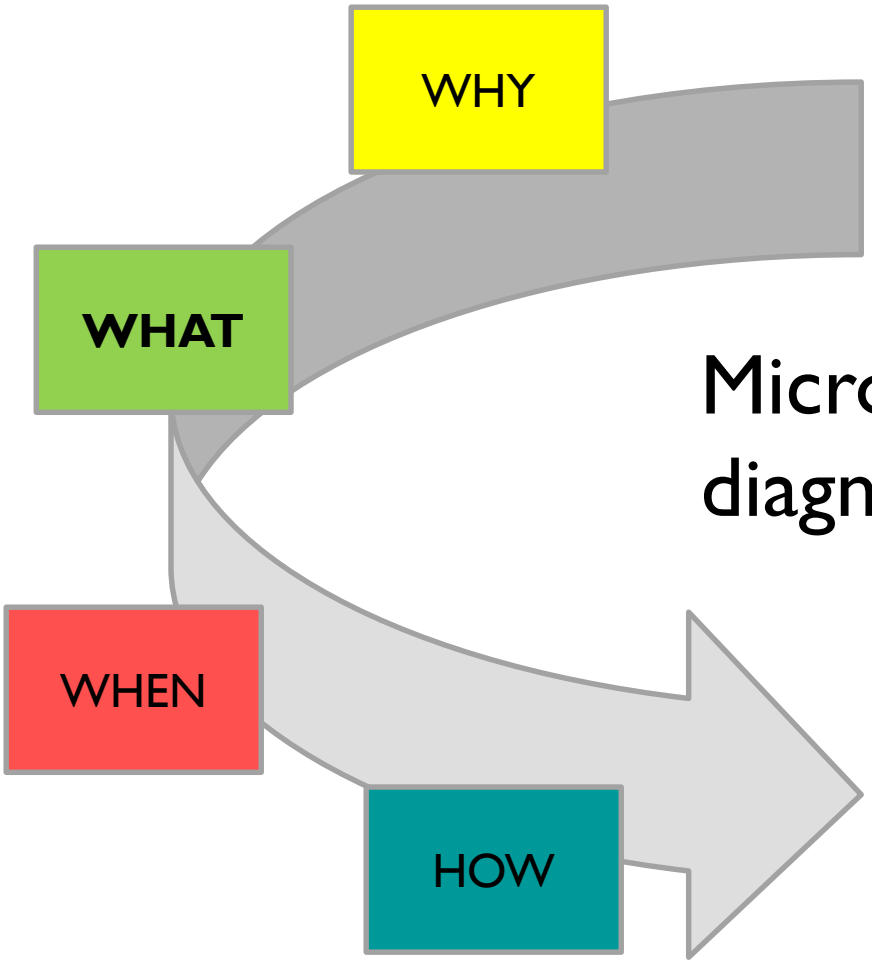
Introduction



Microbiological diagnosis?

Main tasks of the laboratory

- To IMPROVE the management of infectious diseases

→ 1. CONTRIBUTE TO THE DIAGNOSIS

- Presence / absence of pathogens?
- Identify the causative agents of infection (count) / colonization

→ 2. CONTRIBUTE TO THE CHOICE OF ANTIBIOTIC

(Targeted and probabilistic)

- Perform tests of antibiotic susceptibility of clinically significant microorganisms

→ 3. CONTRIBUTE TO THE DECREASE OF EPIDEMIC

The good use of AB depends on the good use of the laboratory

Main tasks of the laboratory

- Produce "quickly" specific, useful, significant and reliable results

- IMPACT
  - On therapeutic decision?
  - On optimized management of patients?
  - On morbidity, mortality?
  - On duration of hospitalization?

Rapid obtaining and communication of results

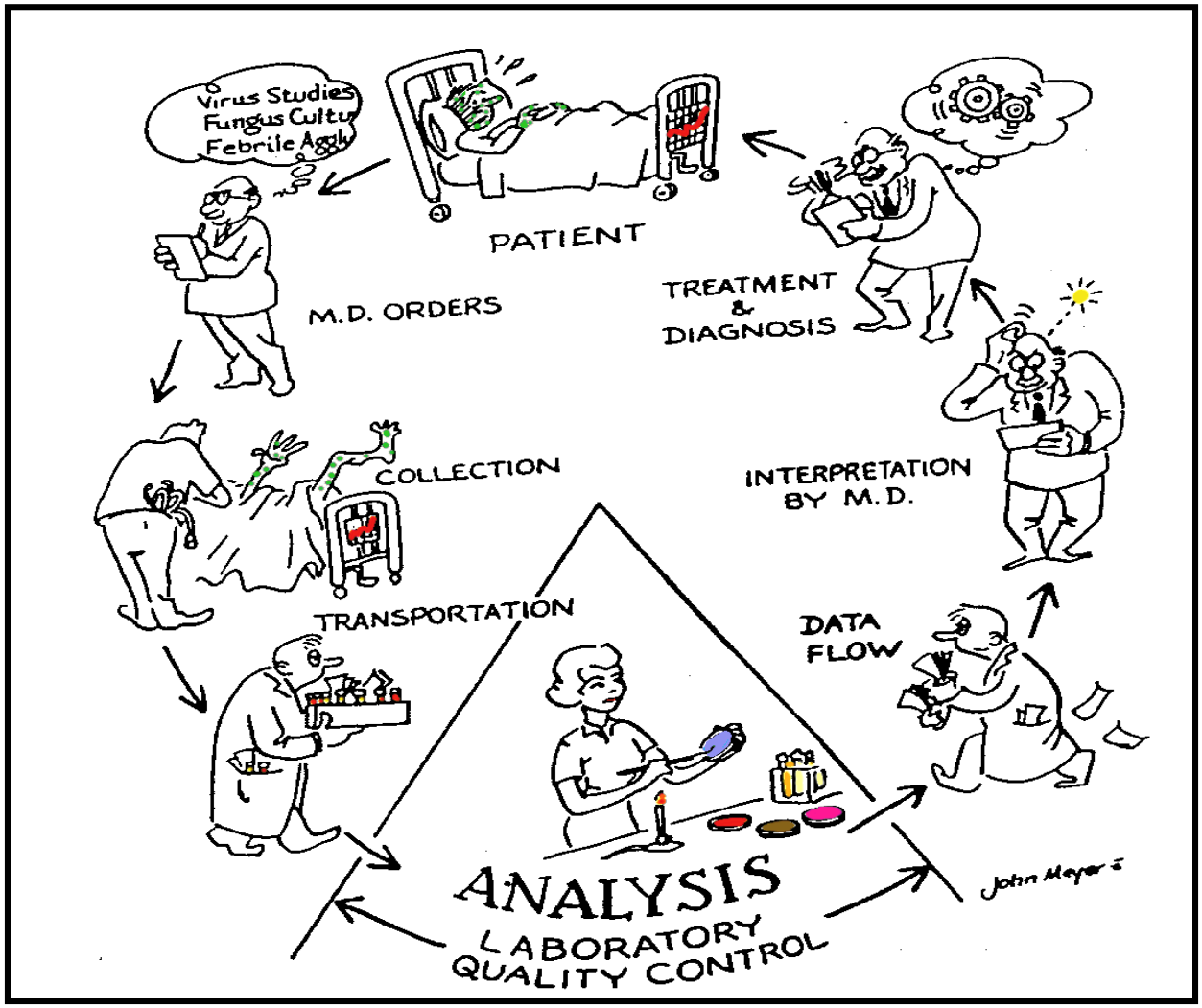
  - On the control of nosocomial infections?
    On antibiotic use?
    On epidemiology of resistance?

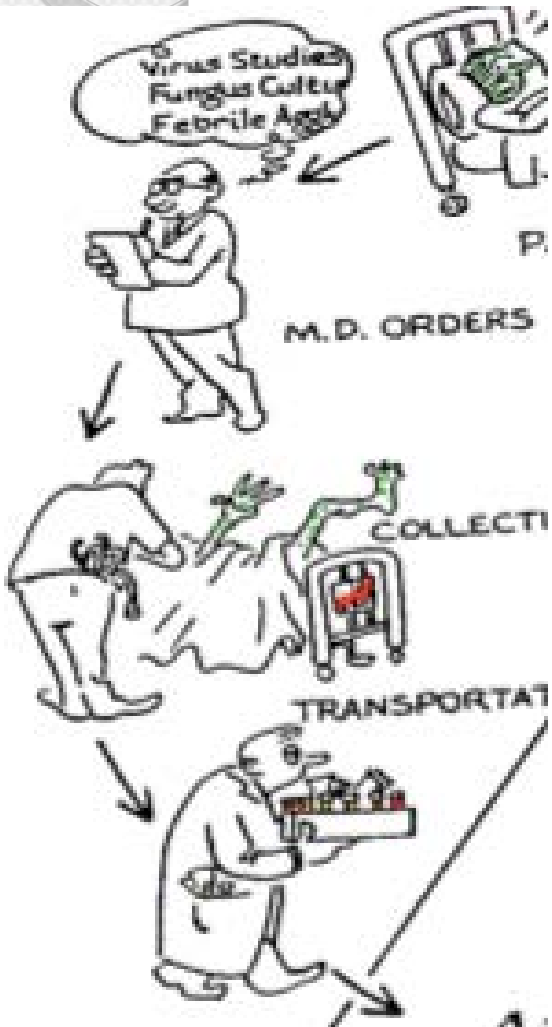
Interaction with pharmacist, hygienist, doctor, specialist in infectious diseases

The ability to achieve precise identification of the causative agent depends

- Interaction between clinician and microbiologist
- Clinician must be aware of the complexity of the tests and the time required to achieve a result
- Microbiologist must appreciate the nature of the patient's condition and be able to assist the clinician in interpreting laboratory reports

Whole process of laboratory tests





Pre-analytical

Pre-analytical considerations

- Quality of the sample
- What samples?
- When taking?
- How to take?
- Sampling equipment and transportation
- Preservation

Choice analysis,
Quality of samples and transport conditions are essential

manual sampling
epidemiological and clinical data,

M.D. orders

- Specify the particular pathogens suspected
  - Legionella, Vibrio cholerae, C.diphteriae ...
- Communicate about
  - Clinical data
  - Antibiotic
  - Notion of travel – country….

Choice of techniques, culture media, interpretation of the results

Type of samples

- From normally sterile sites
  - Any infectious agent identified is significant

!!!
Contamination
→ False positive

- From or through sites with commensal flora
  - Differentiate pathogenic or opportunistic infectious agents from the commensal flora

Identification
Quantification

When take samples?

- As soon as possible in the disease
- Before the administration of AB, if possible
  - A single dose of AB can "decapitate“ the culture
  - Examples :
    - *N. meningitidis* and *S. pneumoniae* meningitis
    - Acute urinary tract infection
- If necessary, after "therapeutic window“
  - Examples:
    - Culture-negative endocarditis
    - Bone infection,

Conservation and transport

Always transfer to the laboratory as soon as possible

→Less than 2 hours at room temperature

- If not less than 24 (48) hours at 4 ° C
  Exceptions: LCR, blood cultures

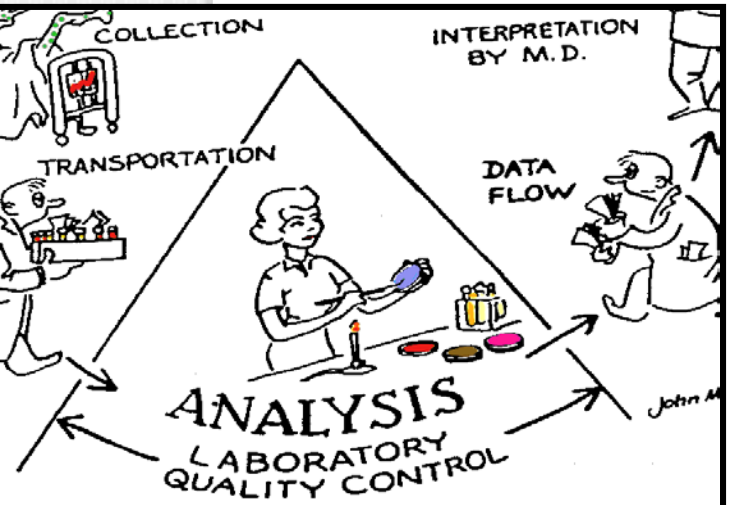
Delay in transporting specimen to laboratory

- Prolongs time to result
- Impacts specimen integrity :
  False-negative and false-positive results
  False-negative results can be life-treatening: meningococci in CNS

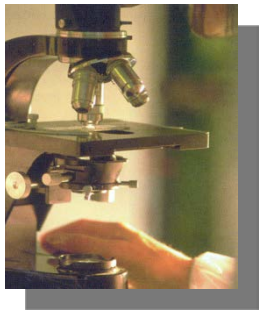
Pre-analytical considerations

- **The quality of the sample determines the quality of the results**
- **Always inform the laboratory of precious samples**

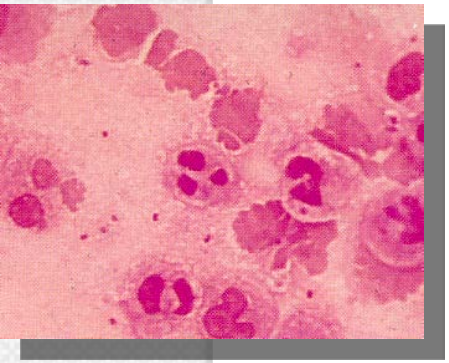
ANALYSIS


COLLECTION
INTERPRETATION BY M.D.
TRANSPORTATION
DATA FLOW
ANALYSIS
LABORATORY QUALITY CONTROL

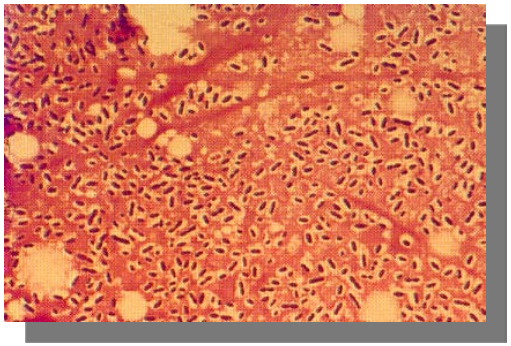
Analysis



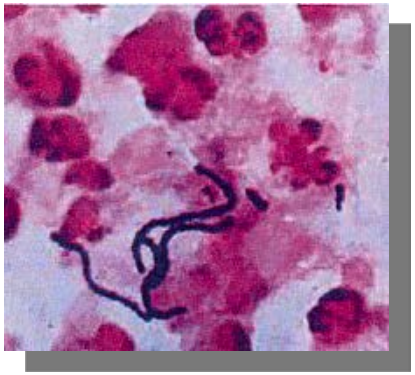
- Direct examination: **GRAM**
  - To assessing the quality of the sample (rejection?)
  - To evaluate the inflammatory response
  - To evaluate the presence of bacteria, fungi, yeast
  - First diagnostic indications



Meningit to *N. meningitidis*

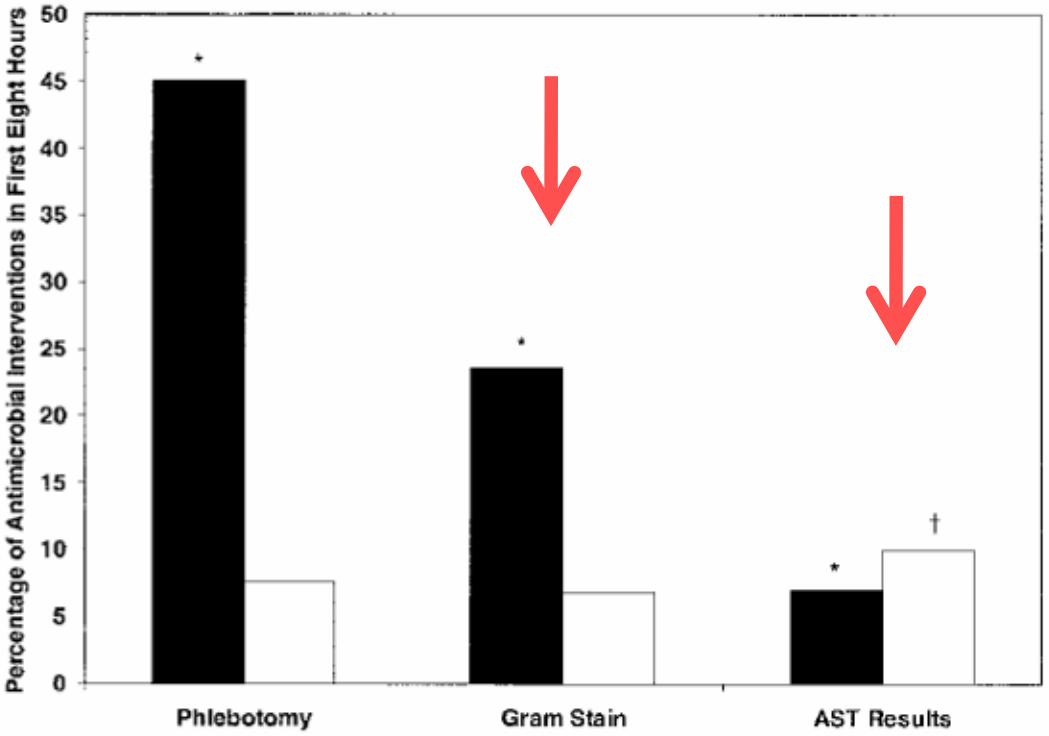


Pneumonia to *S. pneumoniae*



Blood culture with *S. pyogenes*

Impact of laboratory detection and reporting on management of bloodstream infection



Prospective study, 14 months

Iowa Univ. Hosp.
509 bacteremic episodes
(59% nosocomial origin)

50% empiric AB therapy within 2-4 h post-blood culture sampling

Impact of transmission of preliminary result of Gram stain >> final AST result

Munson et al. JCM 2003

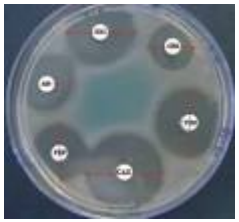
Analysis

- Culture
  - Isolate **all** the bacteria in an infection
  - Differentiate bacteria probably responsible for the infection from contaminating or colonizing bacteria

  → Choice of media and culture conditions

  - type sample
  - suspected organism
  - Gram informations

Analysis



- Antibiogram
  - Impact on AB choice

Good AB use:

- - to conserve their efficacity
- - to limit emergence of resistance
- - to control the healthcare costs

Good use on AB

- Empirical therapy
  - Based on local epidemiology
  - Need for local guidelines
- !!! Reassess the indication and choice of AB after 48h

→ According microbiological documentation

Limit epidemic


"The patient in the next bed is highly infectious. Thank God for these curtains."

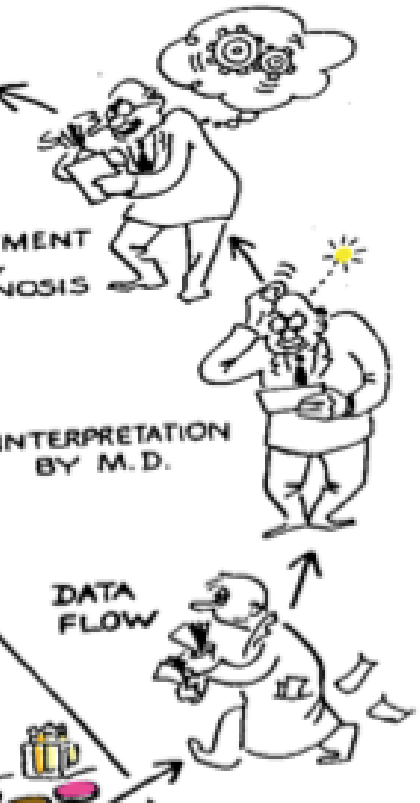
- Microbiologist-Hygienist

1. Promotion of hand hygiene

2. Active monitoring of patients
   - screening
     - MRSA: nasal swab, perineal swab
     - Resistant gram negative bacilli: rectal swab
   - early notification of new cases

3. Contact Precautions
   - Single room isolation or cohorting
   - Use of gloves, gowns, ...
   - Dedicated equipment

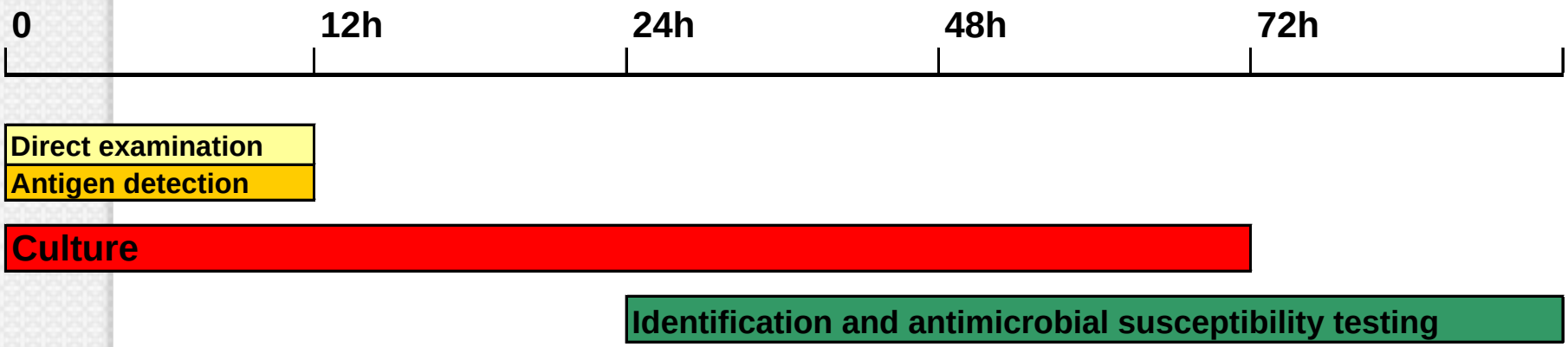
4. Carriers decontamination



POST-ANALYTICAL

Communication of results

- Phone, paper, computer
- At the different steps of the diagnosis



Time to results from 48 to 96h

→Limited impact of laboratory on infectious disease management in starting initial therapy

Different partners of the microbiologist

Microbiologist - Prescribers

- Repeated contact with the prescriber
  - Information about the samples, the pathogen suspected, clinical data
  - Communication of the results
- Report of results: introduce comments, mask some AB… → help the prescriber to interpret the microbiological results

Microbiologist-Infection control

- Role of the laboratory in the surveillance and control of nosocomial infections
  - Epidemiological surveillance
    - Incidence of nosocomial infections
    - Resistance to antibiotics
    - Detection of epidemics
    - Impact of intervention measures
  - Search for human and environmental reservoirs
    - Carrier screening for resistant pathogens (MRSA, CPE ...)
    - Water, food, air, surfaces, instruments (endoscopes, ...)
    -

Hygienist

- Guidelines for isolation precautions (strict isolation, contact isolation, respiratory isolation…)
- Promote hand hygiene
- Carrier decolonization
- Control of patient environment
- Healthcare equipment decontamination
- Control and stop epidemic

Microbiologist- Infectious diseases

- Daily contact to inform and discuss about the precious samples (BC, LCR, biopsy…)
- Infectious diseases specialist:
  - **Intervention on specific request/according the samples** (Blood cultures)
    - Optimization of treatment indication, dosage and selection of molecules, therapeutic deescalation, treatment duration
  - **Infectious disease round in specific units** (chirurgical unit, neurology…)

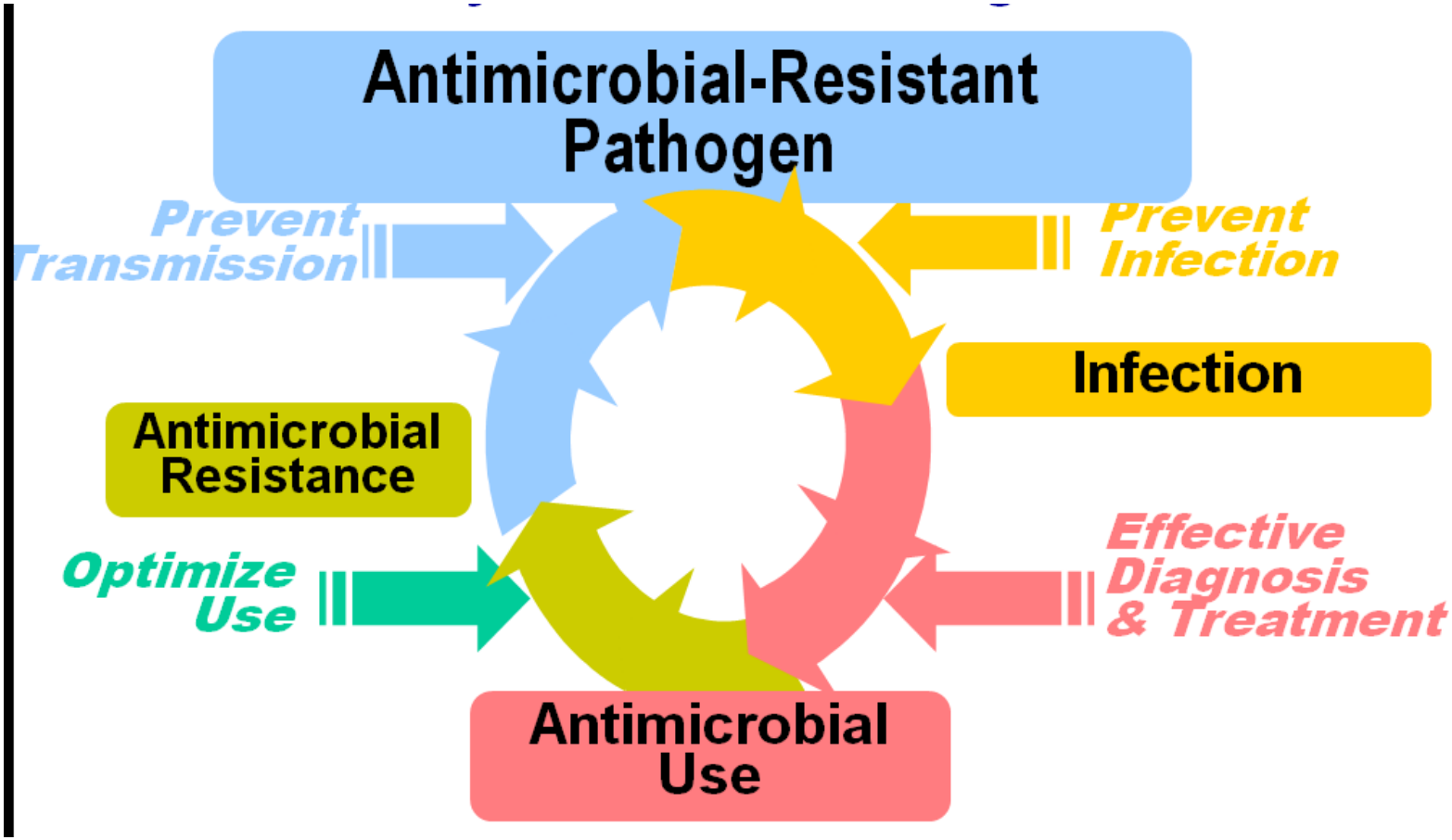
Microbiologist -Pharmacist

- Monitoring of AB consumption
- Antibiotic drug information
- Antibiotic use information

All together

- Antibiotics management group
  - Multidisciplinary team
  - Goals: optimize prescribing and use of AB
    - Edit local guidelines (therapeutic form - recommendation for empirical and etiological treatment and prophylaxis)
    - Implementation of guidelines
    - Antibiotic policy intervention (specific prescription, automatic stop order)
    - Initiative to reduce the excessive consumption of AB
    - Training of medical, nursing and healthcare
    - Analysis of the consumption AB
    - Resistance Surveillance

Conclusion


Antimicrobial-Resistant Pathogen
Prevent Transmission
Prevent Infection
Infection
Antimicrobial Resistance
Optimize Use
Effective Diagnosis & Treatment
Antimicrobial Use

Conclusion